

## Exercises

(Weekends, after all, can be boring . . .)

### **Exercise 1**

Somebody invests \$12,000 into a “combined” savings plan that runs over a total of 20 years at 5% interest rate. After 10 years, this particular savings plan automatically switches from compound to simple interest. Compute the future value after 20 years!

### **Exercise 2**

After accruing interest over 15 years (interest rate 6.5% compounded annually), a principal  $P_0$  has grown to \$2,057.47. For how many years would you have to continue this investment to arrive at \$100,000?

### **Exercise 3**

Billy invests a total of \$10,000 for 125 days at 5% effective annual interest rate (compounded annually). What future value can Billy expect? Do you think that Billy should rather opt for simple interest in lieu of compound interest? Explain!

### **Exercise 4**

Contrary to his plan, Billy all of a sudden needs his money back and so has to withdraw his investment prior to maturity (125 days, see Exercise 3 above). In response, his bank reduces the effective annual interest rate for his savings plan to 4.5%. Billy, however, desperately needs at least \$10,050 from his investment. After how many days would he thus be able to withdraw his money?

### **Exercise 5**

The crafty treasurer of a political party in dire need of private donations has moved \$27 million to a savings account in Liechtenstein. Every four years, he withdraws whatever interest the money has accumulated in the meantime in order to sponsor upcoming election campaigns. After four years, he receives an initial payment of \$6,448,265.57 . Compute the bank’s effective annual interest rate (compound interest).

### **Exercise 6**

Compute the present value of an annuity due that runs over 20 years at an effective annual interest rate of 4% (\$24,000 annual payment)! How would this present value change if the annuity started after a ten-year waiting period (qualitative answer only; provide conclusive evidence)?

### **Exercise 7**

Three brothers have messed up a number of real estate projects and suddenly find themselves mired in debt. Here is what they each owe:

Aaron : \$50,000 due five years from now and another \$50,000 due ten years from now.

Billy : \$110,000 due twelve years from now.

Chuck : Annual payments of \$11,000 over the next ten years, beginning after one year has passed.

Each brother is able to invest existing capital at a nominal annual interest rate of 3.96% compounded semi-annually. Assuming a mathematical viewpoint, who would you say owes the “most”?